US Army Corps
of Engineers
North Central Division

Great Lakes Update

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Responses to Questions at Public Meetings

During five recent public meetings held by the International St. Lawrence River Board of Control (Board), a number of questions were raised by the public on the subject of Lake Ontario outflow regulation. As part of the Board's goal to enhance public understanding of the subject, it compiled some of the key questions raised, along with their answers.

1. Why doesn't the Board implement Regulation Plan 35-P for Lake Ontario, a recommendation that came out of the IJC's Levels Reference Study?
Lake Ontario regulation is governed by the criteria in the IJC's 1952 Order of Approval and its 1956 Supplementary Order. Plan 1958-D, the plan presently in place, was designed with these criteria in mind. The Board is testing the performance of Plan 35P, and another new plan called IS4, for three years before making a recommendation to the IJC. The testing is being performed considering the existing IJC criteria.

2. Why would the Board consider Plans 35P and IS4, when they favor new interests and would cause higher Lake Ontario levels?
These plans do not favor new interests. The intent of the designers of these plans was to maintain or enhance benefits to the long recognized interests, while providing benefits where possible to the newer interests. These plans, when tested with the historical water supplies, result in slightly higher average levels, but reduce the frequency of extreme flood levels on Lake Ontario and downstream compared to existing regulation.

3. Is the Board violating the Boundary Waters Treaty of 1909 when it considers other interests in the regulation of Lake Ontario?
The Board does not agree that consideration of interests other than those specifically mentioned in the IJC's criteria for Lake Ontario regulation would violate the Treaty. Consideration of other interests may result in revisions to the IJC's existing regulation criteria or the existing regulation plan. None of these revisions would specify raising the natural level of water which is a restriction of the Treaty; the natural level being that which would exist without regulation.

4. Why do water levels drop rapidly overnight under ice conditions on Lake St. Louis?
Ice formation restricts flows and causes flow patterns to change, cutting off water to certain parts of the river. It is necessary sometimes to reduce the flows at the Moses-Saunders hydropower plant in order to promote the formation of a stable ice cover. When this occurs, water levels downstream of the plant will drop.

5. What caused the low levels in the Montreal area of the St. Lawrence River this year?
The low level conditions downstream on Lake St. Louis and at the Port of Montreal were mainly caused by low flows from the Ottawa River and other local tributaries, and somewhat less than average Lake Ontario outflows. These were the result of lower than average rainfall this

year and a much lower than average spring snow melt.

6. Did the Board let too much water out of Lake Ontario in January and February this year?
Because of ice conditions in the St. Lawrence River, it is not always possible to release from Lake Ontario the exact amount specified by the regulation plan. Flows at times will be higher when ice conditions permit, to be followed by lower flows at a later time. The Lake Ontario outflows in January this year were more than the amounts specified by the regulation plan. However, in early February when ice began to form in the river, the flows were less than the amounts specified by the plan, offsetting the earlier deviations.

7. Why didn't the Board hold water back on Lake Ontario this spring to deal with the low water levels later downstream on Lake St. Louis and at Montreal?
Early this year, the Board did retain some water on the lake. The stored water was later used in September to help alleviate the low level conditions in the Montreal area.

8. Can the dams in the Ottawa River be used to reduce flooding or raise low water levels in the Montreal area?
No, it is not possible because the nearest control dam does not have sufficient storage capacity to vary the flows for the area. Most storage reservoirs in the Ottawa River system are located too far upstream from the Montreal area for this purpose.

9. Why do levels sometimes fall so rapidly in the upper St. Lawrence River upstream of Cornwall and Massena?
This is a result of high easterly winds causing a surge on Lake Ontario. Low levels at the eastern end of the lake result in low levels in the upper St. Lawrence River.

10. It appears that the Board has been regulating Lake Ontario levels to keep them in the upper half of the regulation range specified in the IJC's criteria. Why?
The fluctuation of Lake Ontario levels is largely dependent on the weather, with regulation having a limited control. Lake levels are high because of high water supplies to the lake, and low supplies will cause low levels. Since Lake Ontario regulation began in 1960, water supplies to the lake have been higher than average due to generally higher than average precipitation on the Great Lakes basin. For this reason, the long-term mean levels since 1960 tend to be slightly higher than the average prior to 1960.

Lake Erie, which is not regulated and provides about 85% of the Lake Ontario supply, also experienced higher levels during the past 35 years than those prior to 1960.

11. What have been the actual Lake Ontario levels before and after regulation?
While many factors affect lake level fluctuations in the post- and pre-regulation periods, comparison of the monthly mean data before and after 1960 shows the following:

* The long-term average during the period 1918-1959 on Lake Ontario is 74.70 m (245.1 feet, IGLD 1985), with the monthly mean values ranging from a high of 75.76 m (248.6 feet) to a low of 73.74 m (241.9 feet).

* In the post-regulation era (since 1960), the long-term mean value is 74.80 m (245.4 feet), with the maximum monthly mean value of 75.73 m (248.5 feet) and the minimum value of 73.83 m (242.2 feet).

* The average seasonal range was 48 cm (18.9 inches) prior to regulation, and 55 cm (21.7 inches) since 1960.

The slightly higher long-term mean level in the post-regulation era is due to higher water supplies to Lake Ontario since 1960. The post-regulation period supplies are about 10% more than those prior to 1960. Lake Erie also had this pattern and that lake is unregulated.

12. Why does the Board propose to raise the Lake Ontario levels to 248 feet (75.6 m) IGLD 1985, from April 1st to October 1st, knowing this would cause flood damage on the lake?
<u>There has been no Board proposal to raise the lake to this level.</u> This was one of the many requests made to the Board during its public consultation process: some called for higher

levels and others called for lower levels.

3. If the Board did not intend to raise the lake level, why was the revetment at the United States Coast Guard Station at Rochester, New York, built so high?

The need for the structure came about as a result of a 1992 storm surge event. At that time, the waters of Lake Ontario were driven ashore by hurricane force northeasterly winds. The station itself sustained flood damage and the accompanying wave action nearly destroyed an existing boathouse. The revetment is designed to protect against future storm surge events similar to the one that occurred in 1992. It was not designed in anticipation of any managed increase in Lake Ontario's water surface elevation.

4. Why can't the Board keep Lake Ontario levels lower in the fall to make room for spring runoff?

The natural seasonal water supply cycle to Lake Ontario typically causes higher levels in June or July, followed by declining levels until December or January. Regulation preserves this cycle and also makes room on the lake for spring runoff. Unless there is a great risk of very high levels in the spring, Lake Ontario should not be drawn down by an amount more than under normal conditions. If the winter turns dry, excessive lowering of the lake will lead to low levels the following spring.

15. Why can't the Board regulate Lake Ontario to near long-term average?

Regulation Plan 1958-D was designed to regulate Lake Ontario's levels and outflows to meet criteria established by the IJC. These criteria aim to provide benefits to the interests, or to provide protection from extreme high or low levels and flows. Maintenance of long-term mean levels for Lake Ontario at all times is not the objective of regulation, nor would it be achievable without wide fluctuations in St. Lawrence River flows. Such flows would be detrimental to many interests, including hydropower, seaway navigation, recreational boating in the St. Lawrence River and riparians downstream.

16. Why don't we regulate Lake Erie outflows so that we can have tighter control for Lake Ontario?

There are no facilities to control Lake Erie's outflows. Recent IJC studies have recommended against Lake Erie regulation on the basis of costs and adverse environmental impacts.

If Lake Erie were regulated, it would not likely result in "tighter control" of Lake Ontario, since interests on Lake Erie would want to vary outflows to meet their needs, resulting in the potential for a larger variation in Lake Ontario levels.

17. Why don't we alter Long Lac/Ogoki and Chicago diversions to better manage Lake Ontario levels?

First, because of their distant location relative to Lake Ontario, it is impossible to vary these diversions to provide a timely response to the ever changing water supplies to Lake Ontario. Second, variations in these diversions only result in very small changes in the total water supplies to Lake Ontario. Third, altering these diversions will have significant adverse impacts on their respective local systems.

18. The IJC's Criterion (j) sets a minimum Lake Ontario level for April 1st. Why is there no maximum April 1st criterion?

The reason for Criterion (j) is to ensure adequate levels on Lake Ontario for the start of the navigation season. Although no maximum was set, the need to avoid monthly mean levels above the Criterion (h) level of 75.37 m (247.29 feet) IGLD 1985 on Lake Ontario at any time reduces the potential for high levels on April 1st.

19. What is the definition of low levels in the IJC's Orders of Approval and regulation criteria?

Low levels are usually considered those that would adversely impact intakes for water supply and commercial navigation on Lake Ontario and the St. Lawrence River. There are presently no low levels provisions related to recreational boating in the IJC's Orders of Approval or regulation criteria.

20. Did the adoption of the new International Great Lakes Datum of 1985 raise the Lake Ontario levels six inches?

The new datum did not raise lake

levels, it simply assigned a more accurate and up-to-date measurement of the shoreline and lake level elevations relative to sea level. The datum change did not raise the level of the lakes relative to the shoreline. The new elevation values assigned within the new datum were also assigned to the figures in the regulation criteria and regulation plan.

21. The Board kept Lake Ontario levels too high in the Fall of 1992; the result was extensive flood damage in 1993. Why didn't the Board react sooner?

In September and October of 1992, the Board reduced Lake Ontario's outflows to facilitate repairs at the Moses-Saunders hydropower plants at Massena, New York and Cornwall, Ontario, and at the Beauharnois-Cedars hydro complex near Montreal. These actions also helped recreational boaters in the Lake Ontario-Thousand Island area as the boating season had not ended. The water retained on Lake Ontario from this action resulted in a 10 cm (4-inch) rise on Lake Ontario. However, these waters were completely released from Lake Ontario by the end of the year through higher outflows.

The very high water level conditions on Lake Ontario in 1993 were caused by a combination of several factors. Lake Ontario in January 1993 received record high water supplies for the month, while in April the lake received an all-time high record water supply. Severe ice conditions in the St. Lawrence River also reduced its flow capacity for much of the winter. In spite of the difficulties, during the winter and spring the Board was able to make much greater releases from Lake Ontario than specified by the regulation plan. This resulted in Lake Ontario levels being 24 cm (9.4 inches) lower than under the plan, and 36 cm (14.2 inches) lower than would have occurred without regulation.

22. Would lower Lake Ontario levels help with beach replenishment?

The recently completed Levels Reference Study examined the relationship between lake levels, shore protection, shoreline types, and coastal processes. For some of the Lake Ontario shoreline, there is little impact of changing water levels on long-term erosion rates. In the case of beach replenishment, if the source of the beach's sand is interrupted, then lower lake levels will have no impacts. Also, if the shoreline being eroded has clay, the material will not be replaced at any water level.

23. How does a wider range of lake levels help wetlands?

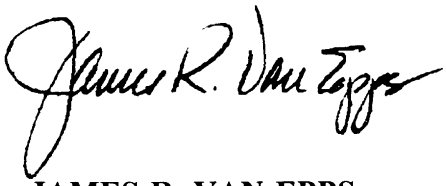
A range of water levels is necessary for a healthy, sustainable wetland. Periodic flooding and drying of the wetlands ensures a succession of a variety of vegetation types, providing a diversity of wildlife habitats.

24. Would improved long-term weather forecasts help manage levels and flows?

Climate experts around the world are working hard on this subject and the Board would welcome any technologies that would ai- in managing the levels and flo\ in the system.

25. How does the Board make its decisions?

The Board constantly assesses the hydrologic conditions in the Great Lakes-St. Lawrence River system. The Lake Ontario outflows are usually as specified by the regulation plan, but the Board also has the discretionary authority to direct higher or lower flows. Decisions to deviate from the regulation plan are made only after careful assessment of the conditions throughout the system, and taking into consideration the needs of all of the users and interests.



JAMES R. VAN EPPS
Colonel, EN
Commanding

Table 1

Possible Storm Induced Rises (in feet) at Key Locations on the Great Lakes December 1995

	Degrees of Possibility				
	20%	10%	3%	2%	1%
LAKE SUPERIOR					
Duluth	1.0	1.2	1.4	1.6	1.7
Grand Marais	0.6	0.7	0.8	0.8	0.9
Marquette	0.9	1.0	1.1	1.2	1.2
Ontonagon	0.7	0.8	0.9	1.0	1.1
Point Iroquois	1.2	1.4	1.6	1.7	1.8
Two Harbors	0.8	0.9	1.0	1.2	1.3
LAKE MICHIGAN					
Calumet Harbor	1.6	1.9	2.3	2.6	2.8
Green Bay	2.0	2.6	3.5	4.2	5.1
Holland	1.1	1.4	1.7	1.9	2.2
Kewaunee	1.0	1.1	1.2	1.3	1.4
Ludington	1.0	1.1	1.2	1.3	1.4
Milwaukee	1.2	1.3	1.6	1.7	1.8
Port Inland	1.2	1.3	1.3	1.3	1.4
Sturgeon Bay	1.0	1.2	1.4	1.5	1.7
LAKE HURON					
Detour Village	0.7	0.7	0.8	0.9	0.9
Essexville	2.2	2.6	3.1	3.4	3.7
Harbor Beach	0.8	0.9	1.1	1.1	1.2
Harrisville	0.7	0.9	1.0	1.2	1.3
Lakeport	1.4	1.7	2.1	2.4	2.7
Mackinaw City	0.9	1.0	1.2	1.4	1.5
LAKE ST. CLAIR					
St. Clair Shores	0.6	0.7	0.8	0.9	0.9
LAKE ERIE *					
Barcelona	2.3	2.7	3.2	3.5	3.8
Buffalo	5.1	5.9	6.8	7.4	8.1
Cleveland	1.2	1.4	1.6	1.8	1.9
Erie	2.5	2.8	3.2	3.5	3.7
Fairport	0.9	1.0	1.1	1.1	1.1
Fermi Power Plant	2.4	2.9	3.4	3.8	4.2
Marblehead	1.9	2.2	2.6	2.8	3.1
Sturgeon Point	4.3	4.8	5.5	5.9	6.3
Toledo	3.0	3.5	4.1	4.6	5.1
LAKE ONTARIO					
Cape Vincent	1.1	1.2	1.4	1.6	1.7
Olcott	0.5	0.6	0.7	0.7	0.8
Oswego	0.7	0.9	1.3	1.5	1.8
Rochester	0.6	0.6	0.8	0.8	0.9

* The water surface of Lake Erie has the potential to tilt in strong winds, producing large differentials between the ends of the lake.

Note: The rises shown above, should they occur, would be in addition to the still water levels indicated on the Monthly Bulletin. Values of wave runup are not provided in this table.

Great Lakes Basin Hydrology

During the month of November precipitation was below average on the Lake Superior basin and above average on the Lakes Michigan-Huron, Erie and Ontario basins. For the year to date, precipitation is about 5% above average for the entire Great Lakes basin. The net supply of water to Lake Superior was below average in November, while the supplies to Lake Michigan-Huron, Erie and Ontario were above average. Table 2 lists November precipitation and water supply information all of the Great Lakes.

In comparison to their long-term (1918-1994) averages, the November monthly mean water level of Lake Superior was 1 inch below average, the level of Lake Michigan-Huron was at average, and Lakes St. Clair, Erie and Ontario were 5, 4, and 6 inches above average respectively. Shoreline residents are cautioned to be alert whenever adverse weather conditions exist, as these could cause rapid short-term rises in water levels. Should the lakes approach critically high levels, further information and advice will be provided by the Corps of Engineers.

TABLE 2
GREAT LAKES HYDROLOGY[1]

PRECIPITATION (INCHES)

BASIN	NOVEMBER				YEAR-TO-DATE			
	1995[2]	Average (1900-1994)	Diff.	% of Average	1995[2]	Average (1900-1994)	Diff.	% of Average
Superior	2.4	2.5	0.1	96	31.0	28.3	2.7	110
Michigan-Huron	4.5	2.8	1.7	161	31.6	29.8	1.8	106
Erie	3.9	2.8	1.1	139	30.9	32.3	-1.4	96
Ontario	5.2	3.1	2.1	168	33.3	32.2	1.1	103
Great Lakes	3.9	2.7	1.2	144	31.5	30.0	1.5	105

LAKE	NOVEMBER WATER SUPPLIES[3] (CFS)		NOVEMBER OUTFLOW[4] (CFS)	
	1995[2]	Average (1900-1989)	1995[2]	Average (1900-1989)
Superior	-21,000	18,000	84,000	80,000
Michigan-Huron	108,000	36,000	189,000[5]	190,000
Erie	20,000	-5,000	211,000[5]	199,000
Ontario	60,000	20,000	267,000	236,000

[1]Values (excluding averages) are based on preliminary computations.
[2]Estimated.
[3]Negative water supply denotes evaporation from lake exceeded runoff from local basin.
[4]Does not include diversions.
[5]Reflects effects of ice/weed retardation in the connecting channels.

CFS = cubic feet per second.

For Great Lakes basin technical assistance or information, please contact one of the following Corps of Engineers District Offices:

For NY, PA, and OH:
COL Walter C. Neitzke
Cdr, Buffalo District
U.S. Army Corps
of Engineers
1776 Niagara Street
Buffalo, NY 14207-3199
(716) 879-4200

For IL and IN:
LTC Robert E. Slockbower
Cdr, Chicago District
U.S. Army Corps
of Engineers
111 North Canal Street
Chicago, IL 60606-7206
(312) 353-6400

For MI, MN, and WI:
COL Randolph O. Buck
Cdr, Detroit District
U.S. Army Corps
of Engineers
P.O. Box 1027
Detroit, MI 48231-1027
(313) 226-6440 or 6441